We claim:

1. A method of designing a telecommunications network, the method comprising the steps of:

A) for all working demand flows required to be routed in the telecommunications network, finding an initial topology of spans between nodes in the telecommunications network that is sufficient for routing all working demand flows, while attempting to minimize the cost of providing the spans;

B) given the initial topology of spans identified in step A, finding a set of additional spans that ensures restorability of working demand flows that are required to be restored in case of failure of any span in the initial topology of spans, while attempting to minimize the cost of providing additional spans; and

C) starting with the initial topology of spans and the additional spans identified in step B, finding a final topology of spans between nodes in the telecommunications network that attempts to minimize the total cost of the final topology of spans, while routing all working demand flows and ensuring restorability of working demand flows required to be restored in case of failure of any span in the final topology of spans.

2. The method of claim 1 in which method step B attempts to jointly optimize the addition of new spans and the routing of working demand flows.

3. The method of claim 1 in which finding the final topology of spans is subject to a constraint limiting the average nodal degree of the final topology of spans.

4. The method of claim 1 in which the working demand flows that are required to be restored are all working demand flows required to be routed in step A.

5. The method of claim 1 in which finding the final topology of spans is subject to a constraint limiting the hop length of any restoration path.

6. The method of claim 1 in which steps A, B and C are each an iterative process that comprises applying a sifter at each iteration to remove unreasonable solutions for the respective step.

7. The method of claim 1 in which finding the final topology of spans is subject to a constraint limiting the connectedness of the final topology of spans.

8. The method of claim 1 in which the final topology of spans is a two-connected topology.

9. The method of claim 1 in which the final topology of spans is a bi-connected topology.

10. The method of claim 1 in which finding the final topology of spans uses an integer programming formulation.

11. A method of implementing a telecommunications network, the method comprising the steps of:

A) for all working demand flows required to be routed in the telecommunications network, finding an initial topology of spans between nodes in the telecommunications network that is sufficient for routing all working demand flows, while attempting to minimize the cost of providing the spans;

B) given the initial topology of spans identified in step A, finding a set of additional spans that ensures restorability of working demand flows that are required to be restored in case of failure of any span in the initial topology of spans, while attempting to minimize the cost of providing additional spans;

C) starting with the initial topology of spans and the additional spans identified in step B, finding a final topology of spans between nodes in the telecommunications network that attempts to minimize the total cost of the final topology of spans, while routing all working demand flows and ensuring restorability of working demand flows required to be restored in case of failure of any span in the final topology of spans; and

D) implementing the final topology of spans.

12. The method of claim 11 in which method step B attempts to jointly optimize the addition of new spans and the routing of working demand flows.

13. The method of claim 11 in which finding the final topology of spans is subject to a constraint limiting the average nodal degree of the final topology of spans.

14. The method of claim 11 in which the working demand flows that are required to be restored are all working demand flows required to be routed in step A.

15. The method of claim 11 in which finding the final topology of spans is subject to a constraint limiting the hop length of any restoration path.

16. The method of claim 11 in which steps A, B and C are each an iterative process that comprises applying a sifter at each iteration to remove unreasonable solutions for the respective step.

17. The method of claim 11 in which finding the final topology of spans is subject to a constraint limiting the connectedness of the final topology of spans.

18. The method of claim 11 in which the final topology of spans is a two-connected topology.

19. The method of claim 11 in which the final topology of spans is a bi-connected topology.

20. The method of claim 11 in which finding the final topology of spans uses an integer programming formulation.

21. A method of modifying a telecommunications network to account for new working demand flows, the method comprising the steps of:

A) for all working demand flows required to be routed in the telecommunications network including new working demand flows, finding an initial topology of spans between nodes in the telecommunications network that is sufficient for routing all working demand flows, while attempting to minimize the cost of providing the spans;

B) given the initial topology of spans identified in step A, finding a set of additional spans that ensures restorability of working demand flows that are required to be restored in case of failure of any span in the initial topology of spans, while attempting to minimize the cost of providing additional spans;

C) starting with the initial topology of spans and the additional spans identified in step B, finding a final topology of spans between nodes in the telecommunications network that attempts to minimize the total cost of the final topology of spans, while routing all working demand flows and ensuring restorability of working demand flows required to be restored in case of failure of any span in the final topology of spans; and

D) implementing the final topology of spans by adding new spans to the telecommunications network.

22. The method of claim 21 in which method step B attempts to jointly optimize the addition of new spans and the routing of working demand flows.

23. The method of claim 21 in which finding the final topology of spans is subject to a constraint limiting the average nodal degree of the final topology of spans.

24. The method of claim 21 in which the working demand flows that are required to be restored are all working demand flows required to be routed in step A.

25. The method of claim 21 in which finding the final topology of spans is subject to a constraint limiting the hop length of any restoration path.

26. The method of claim 21 in which steps A, B and C are each an iterative process that comprises applying a sifter at each iteration to remove unreasonable solutions for the respective step.

27. The method of claim 21 in which finding the final topology of spans is subject to a constraint limiting the connectedness of the final topology of spans.

28. The method of claim 21 in which the final topology of spans is a two-connected topology.

29. The method of claim 21 in which the final topology of spans is a bi-connected topology.

30. The method of claim 21 in which finding the final topology of spans uses an integer programming formulation.